SYSTEM AND METHOD FOR PROVIDING EVENT SPECTATORS WITH AUDIO/VIDEO SIGNALS PERTAINING TO REMOTE EVENTS

CROSS REFERENCE TO RELATED APPLICATIONS

This application claims priority to and the benefit of the filing date of U.S. Provisional Application No. 60/416,758, filed on October 7, 2002 and which is hereby incorporated by reference in its entirety.

BACKGROUND OF THE INVENTION

[0001] This invention relates generally to video and audio signal processing techniques and, more particularly, to methods and systems for receiving video and audio signals from a plurality of sources and for providing a user with combinations of these signals from which to select.

[0002] Spectators attending a stadium for viewing an event, such as a sporting event, for example, are often interested in events simultaneously occurring at other stadiums. As an example, a spectator attending a football game at a stadium may be interested in other football games at other stadiums, particularly at other stadiums within the same general region, for example, hearing commentary or viewing images of other games.

[0003] Radio stations may broadcast AM and/or FM audio signals of stadium events. Such audio signals normally define the comments of one or more commentators who watch a stadium event and comment on the event as it is occurring such that listeners of the audio broadcast may receive real-time information pertaining to the stadium event. For sporting events, the commentary provided by such commentators is often referred to as a "play-by-play" commentary.

[0004] Moreover, a spectator at one stadium may utilize a radio to receive at least one audio event signal from a radio station, which may be any audio signal that provides information (e.g., real-time and/or prerecorded information) pertaining to the event. The radio broadcast allows a spectator to hear information pertaining to an event occurring at another stadium. Unfortunately, an audio event signal pertaining to a stadium event of interest to a spectator is not always broadcast by a radio station using AM or FM signals, thereby preventing spectators outside the stadium from receiving the broadcast. Further, in situations where an audio event signal of interest to a spectator is broadcast in such a manner that it may be received, the spectator may be attending a stadium event out of range of the audio event signal of interest. Thus, a spectator at one stadium is not always able to receive an audio event signal providing detailed audio information about an event occurring at another stadium. A spectator likewise may be unable to receive a video event signal providing detailed video information about an event occurring at another stadium.

BRIEF DESCRIPTION OF THE INVENTION

[0005] In one exemplary embodiment, a method providing content for access by a portable device at an event is provided. The method includes receiving a plurality of signals from a plurality of sources and combining at least some of the plurality of signals for transmission to a plurality of broadcast systems, with the plurality of broadcast systems corresponding to a plurality of events (e.g., located at one or more of the events). The method further includes determining the broadcast systems to which each of the combined signals is to be transmitted, transmitting the combined signals to at least one of the determined broadcast systems, and broadcasting the combined signals received by at least one of the broadcast systems corresponding to at least one event. The combined signals are configured to allow selection of content with a portable device, with the content defined by at least one of audio and video signals of the combined signals.

[0006] In another exemplary embodiment, a method of providing content for access by a user at an event is provided. The method includes receiving via a portable device content defined by a plurality of signals from a plurality of sources, with each of the signals selectable using the portable device. The plurality of signals are received at an event and broadcast by a system located at the event. The method further includes outputting at least one of video and audio content based upon at least one of the plurality of signals selected with the portable device.

[0007] In still another exemplary embodiment, a system for providing content for access by a portable device at an event is provided. The system includes a combining component for combining at least some of a plurality of received signals for transmission at a plurality of events, a transmission component for transmitting at least one of the combined signals to at least one of the plurality of events, and a broadcast component corresponding to one or more of the events for receiving the at least one combined signal and broadcasting at the event audio and video signals defined by the combined signal. The audio and video signals are configured to allow for selection with a portable device at the event.

BRIEF DESCRIPTION OF THE DRAWINGS

[0008] Figure 1 is a block diagram of a communication system in accordance with one exemplary embodiment of the present invention.

[0009] Figure 2 is a block diagram of a central facility system in accordance with one exemplary embodiment of the present invention.

[0010] Figure 3 is a block diagram of a broadcast system in accordance with one exemplary embodiment of the present invention.

[0011] Figure 4 is a flowchart of exemplary processes utilized by various embodiments of a communication system of the present invention.

DETAILED DESCRIPTION OF THE INVENTION

[0012] Exemplary embodiments of methods and systems providing spectators at an event with a plurality of audio and video event signals pertaining to other remote events and other content, and from which a spectator may select one or more of the audio and video event signals are described below in detail. A technical effect of the methods and systems described herein include at least one of generating a plurality of different audio and/or video signals at one or more remote locations (e.g., generating multiple audio signal events at different stadiums, with the audio signal events defining information, such as play-by-play commentary pertaining to events at the different stadiums), transmitting the plurality of audio and/or video signals to a central facility, wherein the audio and/or video signals are selectively transmitted to broadcast systems that each service one or more events (e.g., one or more stadiums), and allowing spectators to select from the audio and/or video signals transmitted via the broadcast systems. It should be noted that when reference is made herein to audio and/or video event signals, this refers to any audio or video signal generated and/or transmitted to and/or from an event, such as, for example, audio and video signals that provide information, including, but not limited to, real-time and/or prerecorded information, pertaining to an event.

[0013] In the exemplary embodiments, the methods generally provide spectators at an event with a selection of audio and/or video event signals pertaining to other remote events that may be of interest to the spectators. In particular, a plurality of different audio and/or video event signals are generated at various locations (e.g., remote locations). For example, multiple audio event signals may be generated at different stadiums, and each audio event signal may define information, such as a play-by-play commentary pertaining to the event occurring at the stadium from which the audio event signal is generated or from another stadium.

[0014] Each of the audio and/or video event signals may be transmitted to a central facility, and various communication techniques may be employed to communicate the audio and/or video event signals to the central facility. In an exemplary embodiment, audio and/or video event signals are communicated to a central facility via a communication network (e.g., an existing or specifically designed network), such as the publicly switched telephone network (PSTN). In order to increase performance, the audio and/or video event signals may be transmitted over a high speed communication link, such as, for example, a Tl communication line. It should be noted that the communication links utilized to transmit the audio and/or video event signals to the central facility are not limited to specific types of links or physical land lines, but may include, for example, terrestrial links and/or satellite links.

[0015] At the central facility, the audio and/or video event signals may be selectively coalesced and transmitted to a plurality of broadcast systems that each service one or more events and/or stadiums. For example, a determination may be made that spectators at a particular stadium are likely to be interested in particular ones of the audio event signals. In an exemplary embodiment, such audio event signals are then transmitted to the broadcast system servicing the particular stadium. The broadcast system then may broadcast the audio event signal to the spectators being serviced by the broadcast system. For example, a determination may be made that spectators at a first stadium for viewing a Southeastern Conference (SEC) football game are interested in other SEC football games occurring at other stadiums. In such an case, audio event signals defining the play-by-play commentary of the other SEC football games may be transmitted, by the central facility, to the broadcast system servicing the first stadium. The broadcast system may then broadcast these audio event signals to the spectators at the first stadium.

[0016] For other stadiums, different sets of audio event signals may be provided. For example, for a stadium where a BIG 10 football game is occurring, the central facility may transmit to the broadcast system servicing that stadium, audio event signals pertaining to other BIG 10 football games. These audio event signals may then be broadcast to the spectators of the stadium via the broadcast system. Further, and as another example, for a stadium where a Major League Baseball (MLB) game is occurring, audio event signals pertaining to other MLB baseball games may be transmitted to the broadcast system servicing the stadium. Various combinations of audio event signals thereby may be provided to spectators at various stadiums and are not limited to the combinations described herein. It should be noted that video event signals likewise may be communicated as described herein.

[0017] Transmission of a set of audio and/or video event signals to a particular broadcast system may occur via various transmission methodologies. In an exemplary embodiment, the audio and/or video event signals are communicated to the broadcast systems via a communication network (e.g., an existing or specifically designed network), such as, for example, the PSTN. To provide increased performance, the audio and/or video event signals may be transmitted over high speed communication links such as, for example, a T1 communication line. It should be noted that the communication links utilized to transmit the audio and/or video event signals to the broadcast systems are not limited to specific types of links or physical land lines, but may include, for example, terrestrial links and/or satellite links. Furthermore, audio and/or video event signals may be generated as or may be converted into digital signals in order to enable better and/or faster transmission to and/or from a broadcast system.

[0018] In an exemplary embodiment, when a broadcast system receives audio and/or video event signals from the central facility, the broadcast system may communicate such signals to spectators at the stadium serviced by the broadcast system. The communication of such signals may be wireless and/or non-wireless. For example, the broadcast system may modulate each of the audio and/or video event signals on a carrier signal of a different frequency and wirelessly transmit the modulated signals to the stadium spectators. The stadium spectators may be provided with portable receiver units that demodulate and filter the audio and/or video event signals transmitted by the broadcast system. Specifically, using a receiver unit, a spectator may select one or more of the audio and/or video event signals received by the receiver unit, and the receiver unit may filter out all of the other audio and/or video event signals, thereby recovering the selected audio and/or video event signal or signals. The recovered audio and/or video event signal or signals may then be converted into sound via one or more speakers of the receiver unit or images via a display of the receiver unit.

[0019] It should be noted that a broadcast system and, in particular, an antenna of the broadcast system may be located at or close to the stadium serviced by it. In such an embodiment, the audio and/or video event signals transmitted by the broadcast system can be transmitted over a short distance (e.g., less than approximately one-half of a mile), thereby limiting various restrictions imposed by regulation agencies, such as the

Federal Communication Commission (FCC). Various frequency ranges may be employed, for example, each broadcast system in an exemplary embodiment may transmit audio and/or video event signals within the ultra-high frequency (UHF) range, microwave range (e.g., two to ten gigahertz range), etc.

[0020] Figures 1 through 3 illustrate exemplary embodiments of a communication system 10 that will be described in more detail below. For illustrative purposes, the communication system 10 will be described as enabling spectators attending NCAA football games at stadiums to select and hear a play-by-play commentary and/or see video images of various football games. However, it should be noted that, in other embodiments, the communication system 10 may enable spectators to listen to and view other types of information pertaining to other types of events (e.g., football, auto racing, golf, horse racing, etc.) located at different venues (e.g., race track, open road race course, golf course, etc.) or other types of information (e.g., advertisements).

[0021] Fig. 1 is a block diagram of a communication system 10 of an exemplary embodiment of the present invention. The communication system includes a central facility 12 for receiving audio and/or video signals (e.g., audio and/or video feeds and audio and/or video event signals) from a plurality of sources (e.g., local event and remote sources). The central facility 12 combines various audio and/or video signals as described herein for transmission to one or more broadcast systems 32. In an exemplary embodiment, a separate broadcast system is provided in connection with or corresponding to each of a plurality of events or, for example, a plurality of stadiums. The broadcast systems 32 transmit a plurality of audio and/or video signals to receiver units 65, which allow users attending events, for example, at various stadiums to select audio and or video signals from one or more sources. The audio and video signals define content for audio output or display with the receiver units 65. The sources may be located at the event at which the spectator is attending and providing audio and video signals pertaining to that event, or may be located remote from the event attended by the spectator, and provide audio and video signals pertaining to the remote event. Further, the sources may provide audio and video signals pertaining to other content, such as, for example, advertising.

[0022] As shown in Fig. 2, audio and/or video signals, for example, play-by-play feeds defining play-by-play commentaries of various football games are transmitted to the central facility 12. These play-by-play feeds may be transmitted via satellite, T1, and/or other types of communication links. Further, the play-by-play feeds may be transmitted as digital or analog signals. In an exemplary embodiment, the play-by-play feeds are generated as digital signals or converted into digital signals before being transmitted to the central facility 12.

[0023] The central facility 12, in an exemplary embodiment, includes a feed mixer 15 and a data router 18. The feed mixer 15 combines the audio and/or video feeds and transmits the audio and/or video feeds to the data router 18. The feed mixer 15 combines the play-by-play feeds such that, for example, play-by-play feeds that are likely to be of interest to a group of spectators or users are combined together. For example, the play-by-play feeds may be mixed such that play-by-play feeds associated with games or teams within or from the same region are combined (e.g., multiplexed) together.

[0024] For example, stadiums 13 participating in (e.g., serviced by) the communication system 10 may be categorized based on their regional location. As shown in Fig. 2, the stadiums 13 may be categorized into a plurality of regions 14, such as first through fifth regions (e.g., a Southeast Region, a Southern Region, a Midwest Region, a Central Region, and a Western Region). Each play-by-play feed from the same region may be combined by the feed mixer 15. Therefore, the feed mixer 15 may output combined signals in which each combined signal comprises play-by-play feeds from the same region. For example, one of the combined signals may comprise play-by-play feeds from each stadium within the Southern Region that is hosting a football game. Such a combined signal may comprise play-by-play feeds from Neyland Stadium, Bryant-Denny Stadium, Griffin Stadium, and Memorial Stadium (Clemson).

[0025] The mixing of play-by-play feeds as described herein may be controlled by mixing logic *25*. In one exemplary embodiment, the mixing logic 25 (e.g., user interface such as a computer) receives inputs from a user and mixes the play-by-play feeds based on these inputs, thereby allowing a user to control which feeds are mixed together. In another exemplary embodiment, user preferences (e.g., viewing preferences) or predetermined criteria (e.g., closest games) are used control which feeds are mixed together. Further, an other content insertion control logic 27 may be configured to insert, for example, advertisements and/or commercials into the feeds mixed by the feed mixer 15. It should be noted that the mixing logic 25 and the other content insertion control logic 27 may each be implemented in hardware, software, or any combination thereof.

[0026] The data router 18 may be configured to transmit each of the combined signals to, for example, corresponding events or ones of the stadiums. For example, a combined signal including feeds likely to be of interest to spectators at Neyland Stadium may be transmitted to Neyland stadium. Because spectators attending a sporting event at a stadium are likely to be interested in similar sporting events occurring within the same approximate region, a combined signal having one or more play-by-play feeds from a particular region may be transmitted to the stadiums within the same region. For example, a combined signal including play-by-play feeds from football games within the Southern Region may be transmitted to one or more stadiums within this same region. As a result, the play-by-play feeds defining the combined signal received by a particular stadium are likely to be of interest to the spectators at the particular stadium. In the exemplary embodiment shown in Fig. 2, the combined signals are communicated to the stadiums over a telecommunication network using high speed communication links, such as Tl connections. However, other types of communication techniques may be employed in other embodiments. Further, it should be noted that various other methodologies for determining which stadiums are to receive which feeds may be employed in other exemplary embodiments as desired or needed and as described herein.

[0027] Referring now to Fig. 3, and for example, for each event or stadium, an exemplary embodiment of a broadcast system 32 receives the combined signal transmitted to it by the central facility 12 (shown in Fig. 2). A demultiplexer 35, controlled by control logic 37, demultiplexes the combined signal to thereby recover, for example, each play-by-play feed within the combined signal. A digital-to-analog (D/A) converter 41 converts each recovered play-by-play feed into analog form and provides each of the analog feeds to a modulator 45. Each modulator 45 modulates its received play-by-play feed onto a carrier signal of a different frequency, and a signal combiner 48 combines the modulated signals, which are then amplified by a power amplifier 51, before being wirelessly transmitted by an antenna 52. It should be noted that if the combined signal received by the broadcast system 32 of a particular stadium or associated with a particular event does not include, for example, a feed pertaining to the event occurring at the same stadium, a local play-by-play feed 49 generated at the stadium may be included in the feeds modulated by the modulators 45.

[0028] In one exemplary embodiment, one or more spectators, for example, at the stadium, is provided with a receiver unit 65 capable of receiving and demodulating the signals transmitted by the broadcast system 32. The selected audio and/or video signals, such as play-by-play feeds are then output by the receiver unit 65 (e.g., output as audio from a speaker or video from a display), thereby reproducing, for example, the play-by-play commentary or video images defined by the selected feed(s). For example, assume that a spectator at Neyland Stadium, while watching a Tennessee game occurring at Neyland Stadium, is interested in the football game occurring at Griffin Stadium. In such an example, the spectator may tune his receiver unit 65 (e.g., select a channel) such that the receiver unit 65 filters out all play-by-play feeds except the feed originally generated at Griffin stadium. As a result, the receiver unit 65 outputs the play-by-play commentary of the football game occurring at Griffin Stadium. Moreover, the spectator may listen to this commentary while watching the Tennessee football game or another game on the receiver unit 65.

[0029] In an exemplary embodiment, the receiver unit 65 is portable and allows the user to provide inputs for selecting at least one or more of the audio and/or video signals, such as, for example, play-by-play feeds and/or video signals of interest to the user. One such exemplary portable receiver unit 65 for use in connection with the various embodiments of the present invention is described in co-pending U.S. application entitled "Electronic Handheld Audio/Video Receiver and Listening/Viewing Device" filed on April 18, 2001 and having serial number 09/837,128, the entire disclosure of which is hereby incorporated by reference herein. Another such exemplary portable receiver unit 65 for use in connection with the various embodiments of the present invention is described in co-pending U.S. application entitled "Electronic Handheld Audio/Video Receiver and Listening/Viewing Device" filed on July 30, 2003 and having serial number 10/630,069, the entire disclosure of which is hereby incorporated by reference herein. In another exemplary embodiment as shown in Fig. 3, a receiver unit 65 includes a receiver and converter component 70 that receives and converts each audio and/or video signal received from broadcast system 32 via antenna 52 and antenna 72. The receiver unit 65 also includes a tuner 74 for tuning the audio and/or video feed provided on different frequencies such that feeds on different frequencies can be output from the receiver unit 65.

[0030] Additional components for processing the different types of feeds (e.g., audio and video signals) may be provided, such as, for example, an FM receiver component 76 for receiving and processing frequency-modulated signals. The receiver unit 65 also may include user controls for controlling operation of the receiver unit 65 including a selector (not shown) for selecting between different feeds and sources, a display (not shown) for displaying event images from received video signals, a power on/off component 78 (e.g., switch) for powering on and off the receiver unit 65, and a volume up/down component 80 for controlling the volume output of the receiver unit 65. The receiver unit 65 also includes a power supply 82 (e.g., removable battery, rechargeable battery, etc.) for powering the receiver unit 65. It should be noted that although the receiver unit 65 has been described with particular component parts, it is not so limited, and additional or different component parts may be provided as desired or required (e.g., storage component for storing audio and/or video feeds).

[0031] It also should be noted that it is not necessary for the broadcast system 32 used to transmit signals, for example, to spectators at a particular stadium, to be located at or close to the particular stadium. However, locating the broadcast system 32 at or close to the stadium may be desired or needed (e.g., results in less strenuous FCC restrictions). Additionally, it is not necessary for the central facility 12 to selectively determine which of the audio and/or video signals (e.g., play-by-play feeds) are to be provided, for example, to the different stadiums. For example, the central facility 12 may be configured to provide each audio and/or vide signal to each of the stadiums regardless of each stadium's regional location. Further, it should be noted that video event signals in addition to or instead of audio event signals may be processed by the communication system 10 described above. For example, in addition to or instead of generating and providing a play-by-play audio signal of an event, a camera may generate a play-by-play video signal of the event. This video signal then may be transmitted to the central facility 12, which mixes the video signal with, for example, other audio and/or video signals from other events. After being transmitted to a broadcast system 32, the broadcast system 32 may modulate and transmit the video signal to, for example, spectators at the stadium, similar to the manner in which the audio signals are modulated and transmitted to spectators at a stadium, as described above. The receiver unit 65 may include a video display for displaying the video signal when such signal is selected by the spectator's input. An exemplary system for distributing the audio and/or video signals is described in U.S. Patent 6,578,203, the entire disclosure of which is hereby incorporated by reference herein. For example, the system described therein may be employed to provide to spectators at a stadium the audio and/or video signals received from the central facility 12.

[0032] Moreover, the spectator may view a play-by-play video signal from an event at a remote stadium and may simultaneously listen to a play-by-play audio signal from the same event. Alternatively, the spectator may view a play-by-play video signal from an event at a remote stadium and may simultaneously listen to a play-by-play audio signal from another event at another remote stadium or from the stadium at which the spectator is present. Furthermore, it is not necessary for all of the signals processed by the communication system 10 to pertain to an event occurring at a stadium. For example, a spectator may view a play-by-play video signal pertaining to an event at a remote stadium while listening to an audio signal defining music unrelated to any of the events at any of the stadiums or a video signal defining programming unrelated to any of the events at any of the stadiums (e.g., advertisement or commercial).

[0033] Fig. 4 is a flowchart 100 illustrating exemplary processes utilized by the communication system 10. The technical effect of the communication system 10 is achieved by first receiving a plurality of audio and video signals from one or more sources (e.g., audio and video signals from a plurality of stadiums) at 102. A determination is then made at 104 as to which audio and video signals to combine. This may include, for example, categorizing the audio and video signals based upon the geographic location of the source of the signals (e.g., signals from stadiums within a particular geographic region or relating to teams in that region) and/or combining the signals based upon predetermined criteria (e.g., combine signals based upon user preferences). It should be noted that the audio and video signals may be combined based upon other criteria, determinations or factors, such as, for example, time of day (e.g., events occurring at the same time), the type of event (e.g., all sports events, all football games, all baseball games, etc.) and/or variety (e.g., combine signals to provide diverse programming). A determination is also made at 106 as to other content to be included as part of the signals to be combined (e.g., advertisements or commercials).

[0034] A determination is then made at 108 as to which broadcast systems 32 (shown in Fig. 1) the signals to be combined are to be transmitted. This also may include a determination of the type of communication link to use to transmit the combined signals. Based upon the determinations at 104, 106, 108 and any other user inputs (e.g., used specified content), combined signals are transmitted to the determined broadcast systems 32 at 110.

[0035] The combined signals are received by the broadcast systems 32 and processed (e.g., demultiplexed and modulated in analog form) at 112, for transmission (e.g., local transmission) to a one or more receiver units 65 (shown in Fig.

3), for example, within and in close proximity to a stadium. This processing may also include modulating the signals onto different frequencies. The processed signals are then broadcast at 114 to the receiver units 65 within the broadcasting range of the broadcast systems 32. For example, the signals may be broadcast to receiver units 65 within a stadium or within one hundred feet of the stadium. A user having a receiver unit 65 may then select the specific signals, for example, defining different feeds to output from the receiver unit 65.

[0036] In operation, a user with a receiver unit 65 at an event (e.g., football game) may select from different audio and video feeds that are broadcast at the event. For example, a user may select audio and/or video signals defining content from another event (e.g., another football game), video feeds of different angles or portions of the event being attended and/or other content such advertising and/or commercials. The audio and/or video content may be accessed real-time or stored for later hearing and/or viewing (e.g., to review a football play or listen to specific commentary). The selectable audio and video signals may be provided, for example, on predetermined channels selectable by a user. Further, the sources of these audio and video signals may be located at the event, remote from the event, or accessed from stored or archived audio and video signals. Additionally, the communication system 10 may be configured such that the receiver unit 65 may receive audio and video signals at locations other than at an event (e.g., at a stadium event), such as, for example, at a home in connection with satellite television broadcasting. Further, conditional access may be provided such that, for example, only authorized receiver units 65 (e.g., receiver units 65 having authorized serial numbers) can receive the audio and video signals (e.g., encrypted audio and video signals).

[0037] While the invention has been described in terms of various specific embodiments, those skilled in the art will recognize that the invention can be practiced with modification within the spirit and scope of the claims.